Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

ise. The spore measurements, a delicate but necessary matter, have been well done. It may be added, that since the appearance of this work Mr. Cooke, in company with Mr. C. H. Peck of Albany, New York, has been engaged in the study of the Erysiphei of the United States, and has already published several papers which might well accompany the hand-book to the study table of any American botanist.—E. C. B.

BOTANY.

Second Growths in Trees.—A matter which has not received the attention which perhaps it deserves is the growth of trees twice or more during the same season. Some, like the horse chestnut, make but a single growth, when the upper leaves are reduced to perfect bud scales; and although there is, probably, a growth of the embryonic parts of the next year's leaves and flowers beneath these scales for sometime afterwards, to all appearance growth ceases for the season. Others, as in the Norway and sycamore maples, gradually decrease in the size of their leaves as midsummer approaches; the internodes occupy less and less space, but before finally taking on the condition of a terminal bud a new growth commences, the leaves grow larger, and before the final fall resting comes, they have nearly reached the size of those of the early summer time. The English oak almost always makes two of these growths, and sometimes three, and this is also the case with *Pinus mitis*, *P. Banksiana*, *P. inops*, *P. pungens*, and sometimes but not so frequently in *P. rigida* and *P. Tœda.* I think it likely that in most trees which make a continuous growth through the summer season there is more or less of this growth rest, and successive reaction. In the apple tree, and the Carolina and cottonwood poplars, this approach to rest about midsummer is very plainly seen by a shortening of the internodes; after this they again widen, and in the case of these two, the leaves of the second growth are much larger and more vigorous in every respect than those of the first cycle or wave of growth. I have often set myself to the study of the causes of this varying growth force, without feeling satisfied that I could comprehend them clearly. In some way it would seem to be dependent on the powers of nutrition, as in the apple and many other trees it is only the most vigorous shoots which make a renewed start; but on the other hand I have seen two trees of English oak side by side together for about twenty years, one making mostly three of these growth cycles, and the other but two, and yet up to this time neither of these has gained any advantage in size over the other. Again, in the case of the horse chestnut, if the leaves be picked off before the terminal bud is quite mature, it will make another growth the same season. In like manner if the leaves of most trees be taken off before the cycle of growth has been quite completed, most of the axillary buds, which otherwise would have remained dormant till the next year, will at once push into growth. If the leaves have to aid in the *immediate* nutrition of the axis with which they are connected, which I am sometimes led half to doubt, the check to nutrition by their loss seems rather to aid more than full nutrition does in the secondary axial development. It is however certain that it is the most vigorous growths on any tree, or the most vigorous individuals, or even varieties, which make these repeated cycles. The common European ash rarely makes a second growth unless in a very vigorous condition. The variety *heterophylla*, which makes a longer, and a stouter growth, usually makes two ; but another variety, known in gardens as *Fraxinus excelsior jaspidea*, which has stouter branchlets than either, generally makes three growths.

It would be very interesting to know exactly the relation between nutrition and accelerated growth as exhibited in these successional waves. I have, in papers no doubt familiar to many of your readers, shown how varying powers of nutrition modify the form of leaves, and in other cases even regulate the production of the sexes; and it is by no means improbable that the same laws will be found operative in the production of species itself; for frequently specific, perhaps one might say generic, differences are no greater, than are sometimes found in the varying growths on the same tree, or the differences between one sex and another. This is a well known fact, as genera of both plants and animals have not unfrequently been founded on specimens which were in time found to be but another sex of the same thing.

A knowledge of these successive annual growths may aid our friends in systematic botany. As Mr. Gilman points out, in the AMERICAN NATURALIST Vol. vi, p. 684, in his note on the gray pine, Dr. Engelman divides our American pines according as the female flower is lateral or terminal. But really all these pines are terminal,—that is to say the flowers terminate one or the other of these growth cycles. If the shoot makes but one of these efforts, the flower remains terminal; but if after forming these buds, it "concludes" to go on again with another growth, the flower is of necessity pushed aside, and then the cone becomes lateral. In other words, there is no such thing in Pinus as a lateral cone when there is but a single cycle of annual growth, and therefore the division of Dr. Engelman is founded on an accidental rather than an organic difference. I think however that what are known as the terminal flowered group never make a second growth, and therefore Dr. Engelman's division is excellent, only changing the description into "Pines which never make a second growth" and "Pines which generally do." The gray pine can then stay where it is without the creation of an intermediate group as suggested by Mr. Gilman.

In the suggestions I have made here, there is nothing new. They have appeared at various times during the past six years in the "Proceedings of the Academy of Natural Sciences of Philadelphia;" but I suppose the mission of the NATURALIST is to extend knowledge, as well as to record the discovery of new facts.—THOMAS MEEHAN.

ZOOLOGY.

THE SLAUGHTER OF THE BUFFALO.—The destruction of this noble beast was carried on during the past year with a rapidity entirely unprecedented, although it has been a matter of regretful comment for years. I have authority for the assertion that one firm in Leavenworth received thirty thousand hides per month, while two others in Kansas City received fifteen thousand each in the same time. This is at the rate of two thousand slain per day. The immense piles or stacks of hides, to be seen at all the stations along the line of the Kansas Pacific railroad, bear witness to the slaughter. Prof. Mudge of Manhattan, Kansas, who is well informed as to the economy of the plains, places the number killed at one thousand, a number sufficiently high to insure the early extinction of the species.

It is to be greatly hoped that Congress will early take action for the preservation of a reduced herd of buffalo, in a reservation set apart for the purpose, or enact protective laws. Such might impose penalties on persons found in possession of any part of